II. "On Remains of a large extinct Lama (*Palauchenia magna*, Owen) from Quaternary deposits in the Valley of Mexico." By Professor OWEN, F.R.S. &c. Received March 22, 1869.

(Abstract.)

The author premises to his descriptions of these remains a summary of the evidence of Fossil Cameloid Quadrupeds in the memoirs and works of Lund, Pictet, De Blainville, Gervais, Burmeister, and Leidy, deferring the further analysis and comparison of the descriptions by the latter palæontologist to the conclusion of the present paper. The subject of it consists of casts and photographs of fossils discovered by Don Antonio del Castillo, mining engineer, in a posttertiary deposit beneath volcanic tufa in the Valley of Mexico.

The fossils include the dentition of the left ramus of the lower jaw, wanting the incisors; also the series of cervical vertebræ, wanting the first or atlas.

Assuming the incisors to be in number as in Ruminants, the dentition of this mandibular ramus is formularized as :—i 3, c 1, p 3, m 3=10.

Of the grinding-teeth, the three molars, with the last two premolars, form a close-set or continuous series of five teeth, the first of which (p 3) is small, simple, conical, and obtusely pointed. A still smaller or rudimental premolar (p 2 or p 1) is situated in the long diastema between the series of five teeth and the canine; the latter tooth is relatively smaller than in the Camel.

Detailed descriptions are given, illustrated by drawings, of each of the teeth, from which the author shows that they have belonged to a Cameloid species, as large as the larger variety of existing Dromedary, but with modifications of the teeth, testifying to a closer affinity with the Lama and Vicugna.

He then proceeds to give detailed descriptions, with figures, of the cervical vertebræ; they present the intraneural position of the vertebro-arterial canals characteristic of the *Camelidæ*, and of the extinct Perissodactyle genus *Macrauchenia*; and the comparisons of the fossil vertebræ are made with the corresponding one of that extinct genus and of the existing species of *Camelus* and *Auchenia*.

The result of the comparison concurs with that of the dental characters in demonstrating the former existence in America of a Cameline Ruminant as large as the largest variety of living Camel or Dromedary, with closer affinities to the Lamas and Vicugnas, yet with such departures from the dental and osteological characters of *Auchenia*, Illig., as justify the author in indicating them by the generic or subgeneric term *Palauchenia*, which he proposes for such extinct form of American Cameline quadruped.

The author, in conclusion, refers more at large to Prof. Leidy's descriptions of *Procamelus occidentalis*, Leidy, and *Camelops Kansanus*, Leidy, pointing out the more important particulars wherein they differ from *Palau-*

chenia magna, Owen, and dwelling on the evidences of a progress from a more generalized to a more specialized type of Ruminant dentition in the extinct Cameloid forms succeeding each other, from the old Pliocene of Nebraska to the new or Postpliocene of Mexico.

Tables of dimensions of teeth and vertebræ of *Palauchenia*, *Auchenia*, and *Camelus*, and drawings arranged for one folding and three 4to plates, accompany the memoir.

III. "On the Proof of the Law of Errors of Observations." By M. W. Crofton, F.R.S. Received March 24, 1869.

(Abstract.)

The object of this Paper is to give the mathematical proof, in its most general form, of the law of single errors of observations, on the hypothesis that each error in practice arises from the joint operation of a large number of independent sources of error, each of which, did it exist alone, would occasion errors of extremely small amount as compared generally with those actually produced by all the sources combined. This proof is contained in a process given for a different object, namely, Poisson's generalization of Laplace's investigation of the law of the mean results of a large number of observations, to be found in the 'Connaissance des Temps' for 1827, and also in his 'Recherches sur la Probabilité des Jugements;' it is also reproduced in Mr. Todhunter's able 'History of the Theory of Probability.' It is not therefore pretended that any new results are arrived at in the present Paper. Considering, however, the importance and celebrity of the question, and the refined and difficult character of Poisson's analysis, it will not probably be deemed superfluous to show how the same law may be demonstrated with equal generality, in a much more simple and elementary manner. The difficulty of the general proof seems indeed to have been so extensively felt, that several attempts have been made to simplify it. However, so far as the present writer is aware, no proof has been given, except Poisson's, which is not open to grave objection, as based upon unjustifiable assumptions, or as unduly limiting the generality of the investigation.

The mathematical reasoning in this Paper is based entirely on the above-mentioned hypothesis as to the causation of error, namely, that errors *in rerum naturâ* result from the superposition of a large number of minuter errors arising from a number of independent sources. The laws of these elementary errors are supposed entirely unknown, no further restriction whatever being imposed on the generality of the investigation; as would be the case, for instance, were we to assume (as has sometimes been done) that each independent source gives positive and negative errors with equal facility. To decide fully how far the above hypothesis (which seems now to be generally accepted) really agrees with facts, is an extremely subtle question in